of the neighbourhood occurred an interesting Ostracod, *Cyclocypris globosa*; and in the White Loch, a species still more interesting and more capricious in its distribution, *Darwinula Stevensoni*.

As regards the botany of the district, I can say very little. My last two visits were made about midsummer, and at that time the sea banks were gorgeous with masses of thrift and red cranesbill (*Geranium sanguineum*), the marshy flats with golden fields of water-flag, the fells with thickets of *Rosa spinosissima* and numerous orchids, the most conspicuous of which was the sweet-scented species, *Gymnadenia conopsea*. These, of course, are all flowers which cannot be overlooked, and are an ever-present delight to the eye and mind: less alluring species, which need to be hunted for, were for the most part passed unnoticed, and such as I did gather were of no particular interest.

G. STEWARDSON BRADY.

PROFESSOR ARTHUR CAYLEY, F.R.S.

MATHEMATICAL science has suffered a grievous loss by the death of Prof. Cayley, which occurred on Saturday last, at Cambridge. There is hardly a branch of pure mathematics which is not indebted to him for original contributions of the highest value, while the important problems which have been elucidated by him are so numerous, and cover so wide a field, that he was certainly one of the greatest mathematicans which the world has ever known.

It was in September 1883, when Cayley was President of the British Association, that he was ranked among our "Scientific Worthies," Dr. G. Salmon being his biographer. We refrain, therefore, from giving a long notice of his life, and content ourselves with a brief sketch of his scientific work.

Cayley was born August 16, 1821, at Richmond, Surrey. At a very early age he showed great liking and aptitude for arithmetical calculations. He entered King's College School, London, at the age of fourteen, and three years later went to Cambridge, where he entered Trinity College. In 1842 he came out as Senior Wrangler and First Smith's Prizeman. Sir George Stokes had been Senior Wrangler in the previous year, and the late Prof. Adams obtained the distinction in 1843.

While still an undergraduate, Cayley commenced his career of mathematical publication by a paper in the *Cambridge Mathematical Journal* for 1841, but it was not until 1852 that he addressed a memoir to the Royal Society, of which he was elected a Fellow in the same year. Very soon after taking his degree at Cambridge, he entered the legal profession, and was called to the Bar in 1849. But during his career as a barrister, he was constant to his first love, mathematics, and it was while in legal practice that some of his most brilliant mathematical discoveries were made. In 1863, after fourteen years of chamber life in Lincoln's Inn, he returned to Cambridge to fill the newly-instituted Sadlerian Professorship of Mathematics, and no one could have been better fitted than he to discharge the duties of the holder of the chair, viz. "to explain and teach the principles of pure mathematics, and to apply himself to the advancement of the science."

With regard to Cayley as an original investigator, his special merit has been described by Mr. Glaisher, who termed him "the greatest living master of algebra." It is difficult to select the work for which he will be the best remembered, but Prof. Salmon defined it as "his creation of an entirely new branch of mathematics by his discovery of the theory of invariants, which has given quite a new aspect to several departments of mathematics . . . And the effect has been that the knowledge which mathematicians now possess of the structure of algebraic forms is as different from what it was before Cayley's time as the knowledge of the human body possessed by one who has dissected it and knows its internal structure is different from that of one who has only seen it from the outside."

Among the honours which Cayley received, may be mentioned the Royal Medal of the Royal Society, awarded to him in 1859, and the Copley Medal in 1882. He was a correspondent in the section of Astronomy of the Paris Academy of Sciences, and was a Fellow or Foreign Member of many other societies and academies, both at home and abroad. He was given the honorary degrees of D.C.L. by the University of Oxford in 1864, and the LL.D. by Dublin University in the following year. Later, the University of Edinburgh conferred upon him a similar honour, and he received the degree of Sc.D. from his own University. The Universities of Leyden, Göttingen, and Bologna also conferred upon him the degree of Ph.D. In 1890, the President of the French Republic made him an officer of the Legion of Honour. This distinction was granted in consequence of a request addressed to the French Minister of Foreign Affairs by the President and other members of the Academy of Sciences.

Cayley's mathematical papers, commencing in the year 1841, have appeared in every periodical mathematical publication of importance in Europe and America. In the year 1887 he undertook the work of editing the series of ten quarto volumes, in which the Syndics of the Cambridge University Press are publishing his collected mathematical papers. The publication of these volumes commenced in 1889, and six of the volumes were reviewed in these columns a year ago (NATURE, January 18, 1894). The number of papers which appear in the six volumes is 416. Altogether seven volumes have as yet appeared. As Cayley is responsible for 724 titles in the Royal Society Catalogue down to 1883, and he has since produced a considerable amount of mathematical work, it seems improbable that ten volumes will be sufficient to contain the results of his prodigious activity and enormous literary industry.

What more need be said about this great master of mathematics? He sacrificed prospects of advancement in the law in order to follow the mathematical work to which he was devoted. He had the power to teach, and the ability to extend the boundaries of knowledge. He was "as distinguished for the amount and universality of his reading as for his power of original work." Truly, his memory will "outlive the life of dust and breath."

The funeral service will take place in the Chapel of Trinity College to-morrow (Friday). Lord Kelvin will be present to represent the Royal Society, and other men of science will probably attend to do honour to the memory of their brilliant fellow-worker.

NOTES.

WE are enabled to state that the communication to the Royal Society on "Argon, a new Constituent of Air," by Lord Rayleigh and Prof. Ramsay, to be given at the Royal Society to-day, will refer to the density of nitrogen from various sources; to methods for removing free nitrogen from air; to the separation of argon from air by diffusion; to the density of argon; to its spectrum (on which a short paper will be read by Mr. Crookes); and to its behaviour at low temperatures. It is interesting to note that Prof. Olszewski, of Cracow, has liquefied and solidified the gas, and will communicate a short paper on the subject. The solubility in water is also recorded. Various attempts to induce chemical combination are described, and general conclusions are drawn in a final section. The ratio of its specific heats shows it to be a monatomic gas, and proves that its atomic weight is approximately 40. The meeting will not be held in the apartments of the Royal Society, but in the theatre of the University of London.

THE metric system of weights and measures is to be introduced into Tunis on March 1.

DR. BREDICHIN has resigned the Directorship of the Pulkova Observatory, on account of ill-health.

DR. E. KÜLZ, Professor of Physiology in the University of Marburg, has just died. He carried out a number of important researches in physiological and pathological chemistry.

SIR JAMES COCKLE, who held the post of Chief Justice of Queensland from 1862 to 1879, died on Monday, at the age of seventy-six. He was elected a Fellow of the Royal Society in June 1865.

PROF. LEWIS R. GIBBES, of the College of Charleston, South Carolina, U.S.A., whose death occurred towards the end of last year, was born August 14, 1810. He was a Professor in the above-mentioned College for more than fifty years, from 1838 to 1892; at first as Professor of Mathematics, afterwards of Astronomy, Chemistry and Physics. Prof. Gibbes published a number of articles on astronomy, natural history, &c., in various journals and in the publications of scientific societies.

IT will be remembered by our electrical readers, that at the contest organised by the City of Paris in 1889 for the best electric meter, Prof. Elihu Thomson was awarded the prize of five thousand francs. Desiring that this sum should serve for the development of the theoretical knowledge of electricity, Prof. Thomson arranged to offer a prize for the best work on one of four important questions in electricity. The papers had to be sent in by the middle of September 1893, but the decision of the Committee organised to adjudicate upon them has only lately been made known. Four memoirs were received, one written in German, one in French, and two in English. It was decided that each of the two memoirs in English deserved the prize. One was by Dr. A. Webster, of the Clark University, Worcester, U.S.A., the subject being "An experimental determination of the period of electric oscillations." The subject of the other memoir was "An examination of the absolute accuracy of the formula for calculating the period of free oscillation of a discharge condenser under circumstances such that the resistance of the circuit has no appreciable disturbing effect." This memoir dealt practically with a determination of "*v*" by a method of free oscillations, and the authors were Prof. O. Lodge and Mr. R. T. Glazebrook. Ultimately it was decided to award a prize of five thousand francs for each of these papers, the money for the purpose having been collected. The collection of the additional money caused the delay in the publication of the decision of the Committee.

THE opinion has often been expressed that corn or at least grass could be profitably cultivated on the high plateaux of Norway. Dr. Hans Reusch, the Director of the Norwegian Geological Survey, concludes, however, in a recent publication, that the soil which once existed, was nearly all scraped away during the Ice Age, and that cultivation could not now be carried on with much success.

THE Royal Photographic Society, which became incorporated on January 1 in this year, have determined that the Society shall hereafter consist of two classes, Members and Fellows. In future, no members will be admitted to the fellowship until they have given the Council satisfactory proof of the possession by them of suitable qualifications for the title F.R.P.S., which in this way will become a guarantee of ability on the part of its holder in either scientific or artistic photography.

DURING the past week, snow has fallen over all parts of the British Islands; in Scotland and the north of Ireland the amounts have been large, and even in the Channel Islands a depth of six inches was recorded. Very sharp frosts have also been experienced in all parts, and for some days the thermometer in places has not risen above the freezing point. The following low readings have been notified to the Meteorological Office: 8° at Llandovery, on the 26th; 2° at Hillington (Norfolk), and 11° at Yarmouth, on the 27th; and 9° at Loughborough, on the 29th January. At Haparanda, in the Gulf of Bothnia, a temperature of – 24° was recorded on January 26 and 29, and over Europe generally the weather was very cold, frost and snow occuring as far south as Nice and Biarritz. A dense fog occurred in London on the afternoon of January 29.

THE twenty-fifth anniversary of the transfer of the telegraph to the State in the United Kingdom was celebrated on Monday, by a banquet at the Hôtel Métropole, under the presidency of the Postmaster-General, Mr. Arnold Morley. The very remarkable developments of telegraphy during the last quarter of a century is shown by some statistical information furnished to the guests. The telegrams have risen from 6,830,000 to 71,465,000, the mileage of line from 14,776 to 32,881, the mileage of wire from 59,430 to 206,304, the instruments in use from 670 to 8500, the number of words per minute capable of being transmitted on the fastest form of instrument from 70 to 600, and the offices from 2932 to 9637.

ON Wednesday, February 6, the Hon. T. F. Bayard, United States Ambassador, will distribute the prizes to evening students of the People's Palace, Mile End Road, E.

THE following are the names of the candidates who passed the recent examination of the Institute of Chemistry:—A. E. Bell, C. S. Ellis, Dr. M. O. Forster, J. Lones, G. H. Russell, W. H. Sodeau, W. L. Sutton, and W. G. Young.

ON Thursday afternoon, February 14, Mr. L. Fletcher, F.R.S., Keeper of Minerals at the British Museum, will begin a course of three lectures at the Royal Institution on Meteorites. The Friday evening discourse on February 8 will be delivered by Dr. G. Sims Woodhead, his subject being "The Anti-toxin Serum Treatment of Diphtheria."

IN accordance with the scheme recommended by the Royal Commission, telegraphic and telephonic communication has been established by the Post Office authorities in connection with the Liverpool life-boat service and look-out stations, and also at various points on the Welsh coast.

ACCORDING to the Paris correspondent of the *Lancet*, a survey of the statistics hitherto published in divers countries of the results of the application of Behring and Roux's method in the treatment of diphtheria up to the last day of December 1894, gives a total of 2700 cases with 433 deaths, or a mortality of 16 per cent.

A GENERAL meeting of the members of the Federated Institution of Mining Engineers will be held on Tuesday, February 12, at 10.30 a.m., in the Examination Hall of the Mason Science College, Birmingham. Arrangements have been made for visits to collieries, &c., on the following day.

THE third series of lectures arranged by the Sunday Lecture Society begins next Sunday afternoon, in St. George's Hall, Langham Place, at 4 p.m., when Mr. A. Smith Woodward will lecture on "The Restoration of Extinct Animals." Lectures will subsequently be given by Dr. R. D. Roberts, Prof. Henry E. Armstrong, F.R.S., Mr. C. T. Whitmell, Dr. C. W. Kimmins, Mr. Douglas Carnegie, and Mr. W. Mayhowe Heller.

THE twenty-second annual dinner of the old students of the Royal School of Mines took place on Friday evening, at the Criterion Restaurant, under the presidency of Mr. W. H. Greenwood. A large number of guests were present, among

them being General F. T. Lloyd, Mr. Jeremiah Head, Prof. J. W. Judd, Prof. Roberts-Austen, Mr. H. A. Wiggin, Mr. E. Matthey, Prof. W. A. Tilden, Prof. A. W. Rücker, Prof. G. B. Howes, Mr. W. Gowland, Dr. W. P. Wynne, Prof. C. V. Boys, Prof. J. B. Farmer, and Prof. A. R. Huntingdon.

THE following arrangements have been made for lectures at the Royal Victoria Hall, Waterloo Bridge Road, S.E., during February: Sir Colin Scott Moncrieff on "Egypt and the Nile"; Mr. Smith Woodward on "A Visit to Russia"; Dr. J. Norman Collie on "The Alps around Mont Blanc"; Prof. Ramsay, F.R.S., on "Some New Discoveries about the Air." This lecture will have special reference to the investigations by Lord Rayleigh and Prof. Ramsay, which resulted in the discovery of a new constituent of the atmosphere.

THE twenty-first general meeting of the Association for the Improvement of Geometrical Teaching was held at University College on January 19, Dr. R. Wormell, the President, in the chair. The report of the Council, proposing the continuation of the *Mathematical Gazette*, and the Treasurer's report were read and adopted. Dr. Larmor, of St. John's College, Cambridge, was elected President in the place of Dr. Wormell, who retires; the other members of the Council, including the hon. secs., R. Holmes (The Avenue, St. Margaret's, Twickenham) and C. Pendlebury (53 Gunterstone Road, West Kensington), were re-elected. After the elections, Mr. E. M. Langley gave some geometrical notes, and Mr. G. E. Heppel read a paper on "Algebra in Schools." After an adjournment, Dr. Larmor took the chair, and papers were read by Rev. C. Taylor ("The A. I. G. T. Syllabus of Geometrical Conics") and Rev. J. J. Milne ("The Conics of Apollonius"), and Prof. Lodge gave some notes on Mensuration. Interesting discussions followed these. All communications with respect to the *Mathematical Gazette* should be addressed to the Editor, 16, Adelaide Square, Bedford.

COLONEL A. T. FRASER, writing to us from Bagdad, says that while travelling lately on the right bank of the Euphrates, he noticed a pair of caves near the usual black woollen cloth tent lived in by the Arabs, and found that, as evening drew in, a number of cows were driven down, and the caves shut with plugs of straw and thorns. "It was evident," he says, "that this must have been the primary use to which those early types of man of the flint and bronze ages, about whom we know so little, put the so-called cave dwellings, that of sepulture being an after-thought. One would imagine, reasoning hastily, that cows and Arabs should have more properly changed places. But the Arabs bring the experience of thousands of years to bear on this question, and prefer the free air to a confined atmosphere suitable only to ruminant beasts, and tents to caves. Having alluvial soil to deal with, the Arabs in this instance dug pits about four feet deep, and domed over the top with brushwood and straw to complete the caves, the whole showing but little above the surface. There was no need of permanence, as encampments shift with the seasons. Under other circumstances the old "cave" races would have dug the entire cavity out of the solid, but still put in their cattle, and remain outside themselves."

FOR some classes of observations involving the use of a spectroscope, the movement of either collimator or observing telescope is objectionable, and for such work it becomes necessary to rotate the prism in order to bring different parts of the spectrum into the field of view. If the condition of minimum deviation be of no importance, as in the case of Mr. Tutton's apparatus for obtaining monochromatic illumination, there is no objection to turning the prism in this way, but if the condition of minimum deviation for the central ray in the field is to be retained, some special device is essential. This has already been accomplished in various more or less elaborate ways, but Mr. F. L. O. Wadsworth has now indicated a means of satisfying this condition very simply (*Astronomy and Astrophysics*, December 1894). The general solution of the problem is effected by the introduction of a mirror into some part of the spectroscopic train between the slit and the focal plane of the observing lens, the mirror having an angular movement equal to one half the change in angular motion of the ray refracted at minimum deviation. The mirror may be disposed in several ways, but that finally adopted for use with the spectro-bolometer is to place it in continuation of the back face of the prism. With this arrangement the emergent ray is parallel to the incident one, so that a direct vision spectroscope is obtained by the use of a single prism. The prism and mirror are together mounted on the graduated circle of the spectrometer, and by making the axis of rotation of the system coincident with the intersection of the plane bisecting the refracting angle of the prism and the plane of the mirror, there is no lateral displacement of the ray at minimum deviation. The idea seems to be an excellent one, and capable of wide application.

THAT gales have a considerable effect upon the heights of tides is very well known. The gale of January 23, furnished an example of this at the East India Dock. According to a letter in the *Times*, high water was due at the Dock at 12·46 a.m. on January 24. At ten o'clock on the previous evening, however, the tide had risen three inches above Trinity datum, and then fell 5 feet 4 inches to midnight. It again rose five inches to 1 a.m., when it went away altogether. The phenomena suggest that, probably, the records of self-registering tide gauges, when discussed in connection with high winds and cyclones, will furnish useful results. Prof. Cleveland Abbe notes in the *Monthly Weather Review* that, during a hurricane at Charleston last September, the excess of the actual over the normal high water mark increased gradually until it reached more than five feet. In this connection some observations on the indication of distant storms by tides are of interest. Captain E. Jones, who for many years kept logs of deep-water voyages of Lieutenant Maury, states that, previous to a cyclonic storm which occurred early in September, he noticed that at low water the tide did not fall near as low as under ordinary conditions, and he came to the conclusion that a cyclone was approaching, as he had noticed before that under these conditions such storms are very certain to make their appearance. He testifies "that this abnormal condition is an infallible indication of a storm approaching or passing by. A storm directly in from seaward generally affects the flood tide even more than a low water tide, but in the present case the high water was about normal. A long experience gives me great confidence in the barometer as affording valuable prognostication of a storm, but this tidal wave along the coast preceding a cyclone must, as it seems to me, give absolute proof that some kind of storm is in progress; the astonishing thing is that the ocean level is affected by the cyclone at such a great distance, and especially ahead of it."

IN the *American Engineer* for January, Prof. H. A. Hazen gives some of the results of a very interesting balloon ascent made in the "Svea" at Stockholm, by S. A. Andrée. The account is taken from the *Proceedings* of the Swedish Academy, vol. 20, part ii., No. 3. The balloon travelled for 136 miles east over the Baltic, the highest point reached being 9900 feet, and at the time of the ascent, Stockholm was nearly in the centre of a high barometric area; this fact, in connection with the position of the balloon over a wide expanse of water, adds great interest to the observations. The diminution of temperature with height, allowing for increasing heat during the day, was about 1° in 250 feet, in the first 4000 feet, which is noteworthy, as the sea surface causes less diminution with height. Above 4000 feet, clouds were encountered, and these changed the rate of diminution, while at the highest point, the result was 1° in 400 feet. The most interesting feature is the great dryness of the air above 7500 feet; at 6000 feet the relative humidity was 100 per cent., and at 1800 feet higher it was only 4 per cent. Prof. Hazen states that this is the most extraordinary fall in humidity ever observed, and it shows how little we really know of atmospheric conditions, even at very low heights. The value of the results to be obtained by balloon ascents in determining the laws of storms is beyond doubt, and Prof. Hazen strongly advocates that such researches should be undertaken.

THE origin of the Alpine Serpentines has always been a subject for wide differences of opinion. The Italian school of geologists until lately upheld the view that they were metamorphosed sedimentary rocks, while English and German geologists maintain their intrusive nature. One of the latest contributions to this subject comes from Dr. Ernst Weinschenk who, in the *Abhandlungen* of the Bavarian Academy of Sciences (Munich, 1894) describes the occurrence and petrography of the serpentines of the Great Venediger, a mountain in the Eastern Alps of North Tyrol. He finds that they are undoubtedly intrusive rocks, formed by the consolidation of a peridotite magma that was squeezed in between the foliation-planes of the neighbouring mica-schists during the great Alpine earth-movements. They thus occur as a series of laccolites (*linsen*), which, we may observe, resemble in their origin those of Shropshire rather than the typical laccolites of the Henry Mountains, which were intruded into horizontal strata. After their first consolidation, the peridotites were crushed by the continuation of the earth-movements, and by the continued action of superheated vapours and solutions were gradually converted into their present condition. The evidence of these changes is seen in the minute structure of the rocks, which, as well as the nature of the metamorphism they have produced in the surrounding schists, is exhaustively described in the paper, and illustrated by a number of micro-photographs.

A SECOND paper, by the same author, deals with the gneiss and granite of the same part of the Alps. These have also been studied by Prof. Löwl, whose results are published in the *Verlag der k.k. geol. Reichsanstalt* (Vienna, 1894). This author treats the subject from a structural point of view, and his memoir is illustrated by a map and several sections; while Dr. Weinschenk describes the petrography in detail. Both authors assert the undoubtedly intrusive origin of these rocks, and incline to class them with the pre-carboniferous "Protogine" of the Western Alps. Dr. Weinschenk regards certain peculiarities in the granite as due to lateral pressure during the period of consolidation, and proposes the term *Piezocrystallization* for the development of structures under such conditions.

THE elasticity of solid gelatine solutions is the subject of an investigation by Erwin Fraas, in *Wiedemann's Annalen.* Sticks of aqueous gelatine were obtained in the following manner. Brass tubes, about a foot long and half an inch thick, were cut in two at the centre and joined by wire rings. They were closed at one end with a cork, and were placed vertically. The gelatine solutions were then poured in, care being taken to prevent adhesion by rubbing with olive oil. The suspension of the sticks was a matter of some difficulty, but it was accomplished by brass clamps of the shape of a cylinder, cut along its length on both sides and roughened inside, which were gently pressed on the gelatine by a spring. It was found that in no case did the volume change by stretching, the diminution girth being compensated by the increase of length. The addition of common salt impaired the elasticity and strength of the sticks very considerably, making them unfit to support a pound weight, while part of the water could be replaced by glycerine, cane sugar, or gum arabic, without making any difference.

THE *Comptes-rendus* of the Paris Academy, of January 14, give an account of some modifications of an electrical anemometer formerly used by the Rev. Marc Dechevrens, at Zi-ka-wei, for recording the horizontal and vertical movements of the atmosphere. The instrument, which is being constructed by M. Richard, is to be erected at the observatory of the Jesuit College in Jersey, and possesses some novel contrivances intended to ensure its satisfactory performance. The fan of the anemometer, which gives the horizontal component, is formed by portions of a cylinder; this arrangement was devised by M. Dechevrens, and is said to give excellent results. There is also an arrangement which assures sufficient duration to the electric contacts, to excite the electromagnets, while preventing prolonged contacts, which exhaust the batteries without doing any good. Two wires out of seven which exist in similar instruments are dispensed with; this is also an important simplification if the registrations are to be recorded at a distance.

THE current number of *Wiedemann's Annalen* contains a paper by Max Weber, on electromagnet pull. The author has measured the pull exerted on a long iron wire, one end of which projects within a helix, when a known current flows through this helix, producing a magnetic field of known intensity. The wire under examination is suspended horizontally by four silk fibres in the same way as in a ballistic pendulum. The displacement of the wire under the action of the coil is measured by means of a microscope, and from a knowledge of the weight of the wire and the length of the suspending fibres the pull can be calculated. The author has investigated the connection between the pull per unit cross-section of the wire ($p_{\parallel}$), the strength of the field within the helix (H), and the intensity of magnetisation (J), and finds that $p_{\parallel} = JH$, when the length of the wire is parallel to the lines of force of the helix, and the diameter of the wire is very small compared with its length. The author has also examined the pull perpendicular to the lines of force, by using two coaxial magnetising coils separated by a small interval, the wire being placed with its length perpendicular to the axes of these coils, and its end passing through the space left between them. If the pull per unit area of cross-section of the wire under these conditions is called $p\perp$, then $p\perp$ is always, in the case of iron, less than $p_{\parallel}$. For fields having an intensity of about 100, the ratio $p_{\parallel}/p\perp$ is about 100, but decreases rapidly with increasing field strengths, and appears to approach unity as a limit. Thus for $H = 12{,}000$ $p_{\parallel}/p\perp = 1{\cdot}11$.

IT is known that the direction of the pendulum line shows a considerable anomaly around Moscow. The line is deviated at Moscow by 10″·6 to the north; at Tsaritsino, in the south-east, the deviation is only 0″·5 in the same direction; and at Podolsk, which is twenty-one miles from the capital, the deviation takes the opposite direction, to the south, and attains − 2″·7. It has been supposed that beneath the neutral zone, at Tsaritsino, there must be great cavities in the rocks, or that the rocks, as a whole, have a density below the average. We now learn from a note by General Stebnitskiy, in the last issue of the *Izvestia* of the Russian Geographical Society (1894, No. 4), that the pendulum observations which have been made around Moscow by M. Iveronoff, give full support to the above supposition. The differences between the lengths of the second-beating pendulum, observed and calculated, being positive at Moscow and at Podolsk (+ 0·0108 and + 0·0064 millimetres respectively), the same difference is negative above the neutral zone of Tsaritsino (− 0·0228 millimetres), thus showing a deficiency in the acceleration due to gravitation to the amount of 1/30,000th of the total force.

The last number of the *Izvestia* of the Russian Geographical Society contains a very interesting account of Baron Toll's expedition to Arctic Siberia and the New Siberia Islands. Baron Toll was sent out by the Academy of Sciences to examine the body of a mammoth which was said to have been discovered on the banks of the Balakhna, a tributary of the Khatanga Bay, and altogether to continue the work which had been entrusted to Chersky, but was interrupted by his death. Lieut. Shileiko undertook the surveys, as well as the astronomical and magnetical observations. After a three months' journey the two explorers reached the village Kazachiye, at the mouth of the Yana, in 71° north latitude. A visit to the mammoth soon proved that there was nothing left but a few pieces of skin with its hair clothing, parts of the extremities, and a broken skull of a young mammoth. A number of remarkable explorations and surveys, astronomical and magnetical observations, and geological explorations were, however, carried out. The chief geological result is the settling of the real positions of the layers which contain relics of the mammoth. They are undoubtedly Post-Glacial, as they overlie the masses of underground ice which form the chief rock of the great Lyakhoff Island, and which, as Baron Toll's observations now prove, are remains of the great ice-sheet which formerly covered both the islands and the mainland, and whose moraines have now been discovered on the mainland. Moreover, these ice masses have the typical granulated structure of the glacier ice, which proves that they have originated from the snow-cover, and could not have originated from any sort of running water. As to the Post-Glacial layers which overlie the above, they contain, besides shells of *Cyclas* and *Valvata* and well-preserved insects, full trees of *Alnus fruticosa*, willows, and birch, fifteen feet high, and bearing perfectly well-preserved leaves and cones. The northern limit of tree vegetation thus spread during the Mammoth period full three degrees of latitude higher than it spreads now, *i.e.* up to the 74th degree, and the mammoths and rhinoceroses of the time lived upon the patches of meadow clothed with the above bushes. It is worthy of note, that the masses of underground ice are not found in the lower parts of the Arctic coast which are known to have been covered by the Post-Pliocene sea, and that they only occur where the land rises a few hundred feet above the present level of the sea—that is, above the evel of the Post-Pliocene ocean.

After considerable delay, Murray's "Handbook for Hertfordshire, Bedfordshire, and Huntingdonshire" has been published. Brief notes on the geology, botany, and antiquities of these counties are given in an introduction.

The Matriculation Directory (No. xvii.) of the University Correspondence College has just been received. It contains the examination papers (together with solutions) set at the recent matriculation examination, and also articles on the special subjects for next June, and for January 1896.

The additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*, ♀) from India, presented by Miss Teresa M. L. Monteath; two Little Auks (*Mergulus alle*) from Norfolk, presented respectively by Mr. Hamon Le Strange and Colonel Feilden; a Cardinal Grosbeak (*Cardinalis virginianus*) from North America, presented by Mr. F. Beresford Wright; two Leopard Tortoises (*Testudo pardalis*), a Cape Bucephalus (*Bucephalus capensis*) from South Africa, presented by Mr. J. E. Matcham; two Mantells Apteryx (*Apteryx mantelli*) from New Zealand, a Black Iguana (*Metopoceros cornutus*) from San Domingo, deposited; a Hog Deer (*Cervus porcinus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

The Natal Observatory.—Mr. Nevill's report upon the work of the Natal Observatory, during the fiscal year ending last June, has been issued. The staff of the Observatory consists of an astronomical assistant, a meteorological assistant, and a computor, all of them ladies. In spite of such limited assistance, much important work has been accomplished. The observations of Mars during the opposition of 1892 have been completely reduced; and as soon as the corresponding observations made at the northern observatories have been reduced and published, it is proposed to compare the two series, and obtain from them a new determination of the distance of the sun. A contribution to the knowledge of the variation of latitude is included in the report. Since 1884 a number of observations have been made, by Talcott's method, to determine the latitude of the observatory. The observations invite consideration, on account of the fact that they were made and reduced before any special attention had been directed to the variation, arising from the suspected periodical inequality, in the direction of the polar axis of the earth. The mean latitude, deduced from the 1023 observations made during the six years 1884–1890, was 29° 51′ 46″·68. The results obtained, from the separate observations of each year, show a steady gradual decrease since 1885. The observed latitude of the Observatory seems to have reached a maximum in that year, and to have steadily decreased since, at a nearly uniform rate of 0″·27 per annum. The rate of decrease up to 1890, however, appears to have quickly diminished, indicating a periodical irregularity in the apparent value of the latitude of the Observatory. Mr. Nevill remarks that a great deal of important work has accumulated at the Observatory, but the Government of Natal will not afford the necessary facilities for printing and publishing it.

The New Dudley Observatory.—The disadvantages of the old situation of the Dudley Observatory had long been recognised, but it was not until 1892 that the generosity of Miss Bruce and other "friends and neighbours of the observatory," permitted the removal of the observatory to its present more favourable site. From an account given by the Director, Mr. Lewis Boss, in the *Astronomical Journal* No. 334, we learn that the observatory grounds consist of six acres, situated in an area of about forty acres, designed to form part of the park system of the City of Albany. The buildings appear to be all that can be desired, and many advantages will no doubt be derived from the provision of dwelling accommodation for the observers. The Transit Circle provided in 1857 has been re-erected with some slight additions, and it is satisfactory to learn that its large aperture of 0·203 m. and focal length of 3 metres, is no detriment to its excellence. A new equatorial, denominated the Pruyn, having an aperture of 31 centimetres, has been presented by the sons of a former President of the Board of Trustees. In this instrument, a photographic combination is obtained by replacing the flint glass of the visual telescope with a second one, and it is believed that this arrangement will be a complete success.

No elaborate programme of work is promised, but "the logic of events and inclination invites the observatory to undertake the comprehensive observation and discussion of stars known to have sensible proper motions." The Transit Circle will accordingly be devoted to this work, and the equatorial will take a subordinate place, "though it is expected that the zealous young assistants will continue to give a good account of themselves in work with this instrument, so far as circumstances permit."

The Milky Way.—Returning to the subject of the distribution of stars in the celestial sphere, C. Easton (*Ast. Nach.* 3270) has derived some results of considerable interest by limiting his attention to two comparatively small regions of the Milky Way, one in Aquila, and another in Cygnus, the latter embracing a specially dark as well as a notably bright region. For each of these regions he finds that the general luminosity of the Milky Way corresponds very much more closely with Argelander's stars of magnitudes 9·1–9·5, than with the stars of greater brightness. A diagram in which all the stars of the Bonn maps have been reduced to the corresponding number of stars of mag. 9·5, shows very little similarity with the features of the Milky Way. Extending his inquiries to the photographs taken by Dr. Max Wolf, showing stars down to mag. 15, he shows that the very feeble stars followed the same law of distribution